Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims

Claim 1 (currently amended).

A control system for switching an electric operation to a manual operation of a door opener, comprising:

a housing 11, including a power unit 12 driving a shaft 120 electrically and transmitting the power to an output shaft 16;

a braking device 13, used for braking said shaft 120 and releasing said shaft 120;

a pull-chain disk device 15 allowed for exerting an external force via a pull chain 152 to rotate said shaft 120;

a clutch device 18, disposed between said shaft 120 and said pull-chain disk device 15, used for unidirectionally rotating said shaft 120 controllably when said pull-chain disk device is rotated by said external force;

a protective device 17 used for cutting off a circuit of a door opener 10' ~~in an abnormal mode~~; and

a driven disk 158 interlocked with said clutch device 18 so as to swing by an angle for actuating said protective device 17 to switch, such that said circuit of said door opener 10' is cut off

and the ~~brake~~ braking device is released jointly to automatically switch to a safe manual mode in any situation, once said pull chain 152 is pulled.

Claim 2 (previously presented).

The control system for switching electric operation to manual operation of door opener according to Claim 1, wherein said braking device 13 comprises a brake disk 132 which, fixed at said shaft 120, is permanently rubbed against a braking friction plate 136 to generate a self-locking brake.

Claim 3 (currently amended).

The control system for switching electric operation to manual operation of door opener according to Claim 2, wherein said brake disk 132 is installed with a brake lining assembly 131 on one side surface, opposite to said braking friction plate 136~~, of the former~~.

Claim 4 (previously presented).

The control system for switching electric operation to manual operation of door opener according to Claim 2, wherein the potential energy of a compression spring 137 is stored in said braking friction plate 136 for pressing against said braking friction plate 136.

Claim 5 (previously presented).

The control system for switching electric operation to manual operation of door opener according to Claim 2, wherein said braking device 13 further comprises a fixed plate 133 fixed at a rear cover 11b and guiding said braking friction plate 136 to slide axially through a plurality of sleeves 135a.

Claim 6 (previously presented).

The control system for switching electric operation to manual operation of door opener according to Claim 2, wherein said fixed plate 133 comprises a pair of projecting pins 134, at two sides thereof, pivotally supporting an U-shaped sway plate 138, and pushing said braking friction plate 136 off said brake disk 132 in order for releasing brake via a pull rod 139.

Claim 7 (previously presented).

The control system for switching electric operation to manual operation of door opener according to Claim 6, wherein said pull rod 139 is extendingly provided with a branch arm 139a, interlocked with said protective device 17, in a swing direction of said sway plate 138.

Claim 8 (currently amended).

The control system for switching electric operation to manual operation of door opener according to Claim 1, wherein said pull-chain disk device 15 comprises a pull-chain disk 151 around a peripheral of which ~~a~~ said pull chain 152 is wrapped, such that cutting off said circuit of said door opener 10', releasing brake, and rotating said shaft 120 are achieved simultaneously by means of pulling said pull chain 152.

Claim 9 (previously presented).

The control system for switching electric operation to manual operation of door opener according to Claim 1, wherein said clutch device 18 comprises a driven wheel 181 disposed at said shaft 120, and an operating member 183 pivotally supported on said pull-chain disk device 15, both of which are combined together restrainedly when said operating member 183 is presented in an unbalance state.

Claim 10 (previously presented).

The control system for switching electric operation to manual operation of door opener according to Claim 9, wherein said operating member 183 is maintained in a balance state by means of a pair of positioning plates 155 installed on an installation surface 1510 of said pull-chain disk 151.

Claim 11 (previously presented).

The control system for switching electric operation to manual operation of door opener according to Claim 9, wherein said operating member 183 comprises an eccentric axial branch arm 183c operating said driven disk 158 when said pull-chain disk device 15 is manipulated.

Claim 12 (previously presented).

The control system for switching electric operation to manual operation of door opener according to Claim 11, further comprising a rotary arm 172 having a middle portion being pivotally supported and two ends interlocked with said driven disk 158 and said brake-releasing pull rod 139, respectively, for releasing brake when said pull-chain disk device 15 is manipulated.

Claim 13 (previously presented).

The control system for switching electric operation to manual operation of door opener according to Claim 12, wherein said circuit of said door opener 10' is cut off while said pull-chain disk device 15 is manipulated owing to the interlocking of a branch arm 139a with a sensor switch 171, when said pull rod 139 is operated by said rotary arm 172.

Claim 14 (currently amended).

A door opener 10 with a self-locking braking device, used for balancing a door leaf as desired and allowed for operating said door leaf by hand in a manual mode, comprising:

a housing 11 surrounding a space having a first accommodating room 11a and a second accommodating room 11c partitioned by a rear cover 11b inside thereof;

a power unit 12, accommodated in said first accommodating room 11a, used for driving a shaft 120, said shaft 120 having a first end 120a and a second end 120b, said first end 120a extending outside said first accommodating room 11a and transmitting the power to an output shaft 16 via a plurality of spur gear pairs 14, and said second end 120b pivoted on said rear cover 11b and extending into said second accommodating room 11c;

a brake disk 132 which, disposed within said second accommodating room 11c, comprises two sides, a brake lining assembly 131 being installed on one side thereof facing to said power unit 12 and passed through by said second end 120b of said shaft 120 at the center of said brake disk 132 so as to be integrally fixed with said shaft 120 to rotate therewith;

a fixed plate 133, disposed within said second accommodating room 11c on the right side of said brake disk 132, having a peripheral and formed with a pair of projecting pins 134 at two opposite edges of said peripheral, said fixed plate 133 being fixed

on said rear cover 11b by a plurality of ~~said~~ threaded fixing parts 135, each passing through a respective sleeve 135a;

a braking friction plate 136, disposed within said second accommodating room 11c on the left side of said fixed plate 133, formed with a plurality of axial through-open slots 136a, at the positions corresponding to said sleeves 135a on said fixed plate 133, for accommodating said sleeves 135a such that the axial slide of this braking friction plate along said sleeves 135a is obtained;

a compression spring 137 having two ends, one of which is installed on a bearing support 11b' at the right end face of said rear cover 11b, and the other is butted against the left end face of said braking friction plate 136 to push the latter toward said brake lining 131 for achieving an abutting state;

an U-shaped sway plate 138 having two legs, each pivoted on said corresponding projecting pins 134 at each fixed plate 133, said sway plate being linked with a pull rod 139 at the bottom thereof for extending outside said housing 11 and used for pushing said braking friction plate 136 toward a position not abutted against said brake lining 131, while said pull rod 139 being extendingly provided with a branch arm 139a in a swing direction; and

a sensor switch 171, fixed on said rear cover 11b, including an abutting arm 171a operated by being abutted against said branch arm 139 to cut off said circuit of said door opener 10, so as to

jointly cut off said circuit of said door opener 10 and release brake for automatically switching to a safe manual mode in any situation once said pull rod 139 is pulled.

Claim 15 (currently amended).

A door opener 10' with a self-locking braking device and an interlocking pull-chain disk device, used for balancing a door leaf as desired and allowed for operating said door leaf by a pull-chain disk device 15 in a manual mode, comprising:

a housing 11 surrounding a space with two openings, the interior of said space being partitioned by a rear cover 11b into a first accommodating room 11a, a second accommodating room 11c, one of said openings being interconnected with an opening of a tail cover 11d, presented as a hollow cylinder, having a limit portion 11e at the bottom thereof for forming a third accommodating room 11d';

a power unit 12, accommodated in said first accommodating room 11a, for driving a shaft 120, said shaft 120 having a first end 120a and a second end 120b, said first end 120a extending outside said first accommodating room 11a and transmitting the power to an output shaft 16 via a plurality of spur gear pairs 14, while said second end 120b pivoted on said rear cover 11b and provided for extending within said second accommodating room 11c;

a self-locking braking device 13 including a brake disk 132 which, disposed within said second accommodating room 11c, comprises two sides, a brake lining 131 being installed on the side thereof facing to said power unit 12 and passed through by said second end 120b of said shaft 120 at the center of said brake disk 132 so as to be integrally fixed with said shaft 120 to rotate therewith;

a fixed plate 133, disposed within said second accommodating room 11c on the right side of said brake disk 132, having a peripheral and formed with a pair of projecting pins 134 at two opposite edges of said peripheral, said fixed plate 133 being fixed on said rear cover 11b by a plurality of ~~said~~ threaded fixing parts 135, each passing through a respective sleeve 135a;

a braking friction plate 136, disposed within said second accommodating room 11c on the left side of said fixed plate 133, formed with a plurality of axial through-open slots 136a, at the positions corresponding to said sleeves 135a on said fixed plate 133, for accommodating said sleeves 135a such that the axial slide of this braking friction plate along said sleeves 135a is obtained;

a compression spring 137 having two ends, one of which is installed on a bearing support 11b' at the right end face of said rear cover 11b, and the other is butted against the left end face of said braking friction plate 136 to push the latter toward said brake lining 131 for achieving an abutting state;

an U-shaped sway plate 138 having two legs, each pivoted on said corresponding projecting pins 134 at each fixed plate 133, said sway plate being linked with a pull rod 139 at the bottom thereof for extending outside said housing 11 and used for pushing said braking friction plate 136 toward a position not abutted against said brake lining 131, while said pull rod 139 being extendingly provided with a branch arm 139a in a swing direction;

a clutch device 18, including a driven wheel 181 fixed, at the center thereof, on the end portion of said second end 120b of said shaft 120 and formed with a plurality of ratchets 182 around the rim thereof and an operating member 183 used for restraining said driven wheel 181, said operating member 183 further comprising a central shaft hole 183a at the top end thereof, an eccentric axial branch arm 183c formed in a direction opposite to said driven wheel 181 at the bottom end thereof, and operating arms 183b, 183b' extending outside in diametrical direction on the left and right sides, respectively;

a pull-chain disk device 15 including a pull-chain disk 151 accommodated within said third accommodating room 11d', the center of said pull-chain disk 151 being pivoted on a central shaft 122 of said tail cover 11d and a peripheral thereof is wrapped around a pull chain 152, one side of said pull-chain disk 151 opposite to said shaft 120 being formed with an installation surface 1510, while the side of said installation surface 1510 being further

formed with a shaft pin 1511 pivotally supported in said shaft hole 183a of said operating member 183, and on said installation surface 1510 a first through-hole 1512 being formed to be passed through by said branch arm 183c of said operating member 183; a pair of positioning plates 155 pivotally supported, at one end thereof, on the other side of said installation surface 1510 by a pair of threaded fixing parts 156, and each having a groove 155a in the middle thereof while the other end 155b thereof being presented as a free end 155b; in which, a second through-hole 1513 accommodating a tension spring 157 is provided on said installation surface 1510 between two positioning plates 155, and two ends of said tension spring 157 are hooked in said grooves 155a of said positioning plates 155, respectively, such that a ~~claming~~ clamping potential energy may be stored between said free ends 155b of said pair of positioning plates 155 for clamping two sides of said branch arm 154c of said operating member 154 to keep said operating member 154 in a balance state;

a driven disk 158, coaxial with said pull-chain disk 151, having a central hole 158a pivoted on the base end of said central shaft 122 of said tail cover 11d, said driven disk 158, including a turning plate 158b, provided for extending in said limit portion 11e of said tail cover 11d, allowed for swinging within said limit portion 11e, and further formed with a locking groove 158c at the end of said turning plate 158b, one end of said driven disk 158

facing toward said pull-chain disk 151 being formed with a projecting core tube 158d, born at the outside of said branch arm 183c of said operating member 183 and formed with a sliding slot 158e around the internal rim of said sleeve 158d;

a resilient annular part 159 with tension, embedded in said sliding slot 158e of said core tube 158d and allowed to frictionally slide on the surface of said sliding slot 158e, while formed with a plurality of retaining arms 159a which, extending toward the center at two ends of said annular part 159, is allowed for abutting against said branch arm 183c; and

a protective device 17, including a sensor switch 171 connected to said circuit of said door opener 10' and fixed on said rear cover 11b, said sensor switch 171 including an abutting arm 171a, located at a position, against which said branch arm 139a may be abutted in the swing travel of said pull rod 139, and a rotary arm 172 disposed between said pull rod and said turning plate 158b, said rotary arm 172 having a first end 172a and a second 172b, and the middle of said rotary arm including a shaft pin 172c pivotally supported in a shaft hole 11f of said limit portion 11e, in which said first end 172a is accommodated in said locking groove 158c of said turning plate 158b, while said second end 172b is formed with a V-shaped opening 172d widened gradually outwardly, the interior of said V-shaped opening 172d being born on said pull rod 139, such that said circuit of said door opener 10' is cut off interlocked

with the release of the brake so as to automatically switch to a safe manual mode in any situation once said pull chain 152 is pulled.